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## 437-004-9000 Air Contaminants.

Exposure to any substance in Tables Z-1, Z-2, or Z-3 must comply with the following.

### (1) Table Z-1.

**(a) Substances with limits preceded by “C” – ceiling values.** Exposure to any substance in Table Z-1, must never be more than the exposure limit for that substance. If instantaneous monitoring is not feasible, then assess the ceiling as a 15-minute time-weighted average. Exposure must not exceed that level any time during the workday.

**(b) Other substances – 8-hour time-weighted averages.** Exposure to any substance in Table Z-1, must never be more than the 8-hour Time-Weighted Average for that substance in any 8-hour shift of a 40-hour work week.

**(c) Other substances – excursion limits.** Excursions in exposure levels may be more than three times the PEL-TWA for no more than a total of 30 minutes during a workday, and must never be more than five times the PEL-TWA, if the PEL-TWA is not exceeded.

**(d) Skin designation.** Use gloves, coveralls, goggles, or other appropriate personal protective equipment, engineering controls or work practices to prevent or reduce skin absorption of substances in Table Z-1 with an “X” in the Skin Designation column following the substance name.

**(e)** Table Z-1 has hazardous substances commonly found in agriculture. Division 2/Z, OAR 437-002-1000, Table Z-1 has a complete list of regulated substances. If your operation uses substances not common to agriculture, you must check Table Z-1 in 437-002-1000. That table is adopted here and applies equally to agriculture.

**(2) Table Z-2.** Exposure to any substance in Table Z-2 must never be more than the following limits:

**(a) 8-hour time-weighted averages.** Exposure to any substance in Table Z-2, in any 8-hour work shift of a 40-hour work week, must never be more than the 8-hour time-weighted average limit for that substance in Table Z-2.

**(b) Acceptable ceiling concentrations.** Exposure to a substance in Table Z-2 must never be more than the acceptable ceiling concentration during an 8-hour shift except:

**(i) Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift.** Exposure to a substance in Table Z-2 must never be more than the acceptable maximum peak above the acceptable ceiling concentration and must not exceed the maximum duration for the substance during an 8-hour shift.

**(c) Example.** During an 8-hour work shift, an employee's exposure to benzene may be an 8-hour time-weighted average (TWA) of 10 ppm. Concentrations of benzene during the 8-hour work shift may not be more than 25 ppm, unless that exposure is no more than 50 ppm and for not longer than 10 minutes during an 8-hour work shift. Such exposures must be compensated by exposures to concentrations below 10 ppm so that the 8-hour time-weighted average is less than 10 ppm.

**(d) Skin designation.** Use gloves, coveralls, goggles, or other appropriate personal protective equipment, engineering controls or work practices to prevent or reduce skin absorption of substances in Table Z-2 with an "X" in the Skin Designation column following the substance name.

**(3) Table Z-3.** An employee's exposure to any substance in Table Z-3, in any 8-hour work shift of a 40-hour work week, must never be more than the 8-hour time-weighted average limit given for that substance.

**(4) Computation formulae.** The computation formula that applies to exposure to more than one substance, for which 8-hour time-weighted averages are in OAR 437, Division 4/Z, Chemicals/Toxins, to determine if an exposure is over the regulatory limit is:

**(a)**

**(i)** Compute the cumulative exposure for an 8-hour work shift as follows:

$$E = (C_a T_a + C_b T_b + \dots C_n T_n) \div 8$$

Where:

E is the equivalent exposure for the shift.

C is the concentration during any period T where the concentration remains constant.

T is the duration in hours of the exposure at the concentration C.

The value of E must not exceed the 8-hour time-weighted average in Subdivision 4/Z.

**(ii)** To illustrate the formula in **(4)(a)(i)** above, assume that Substance A has an 8-hour time-weighted average limit of 100 ppm (Table Z-1). Assume that an employee is subject to the following exposure:

Two hours exposure at 150 ppm

Two hours exposure at 75 ppm

Four hours exposure at 50 ppm

Substituting this information in the formula, we have

$$[(2 \times 150) + (2 \times 75) + (4 \times 50)] \div 8 = 81.25 \text{ ppm}$$

Since 81.25 ppm is less than 100 ppm, the 8-hour time-weighted average limit, the exposure is acceptable.

**(b)**

**(i)** In case of a mixture of air contaminants, compute the equivalent exposure as follows:

$$E_m = (C_1 \div L_1) + (C_2 \div L_2) + \dots (C_n \div L_n)$$

Where:

$E_m$  is the equivalent exposure for the mixture.

$C$  is the concentration of a particular contaminant.

$L$  is the exposure limit for that substance in Subdivision 4/Z.

The value of  $E_m$  must not exceed unity (1).

**(ii)** To illustrate the formula in **(4)(b)(i)** above, consider the following exposures:

Substance	Actual concentration of 8-hour exposure	8-hour time-weighted average exposure limit
B	500 ppm	1,000 ppm
C	45 ppm	200 ppm
D	40 ppm	200 ppm

Substituting in the formula, we have:

$$E_m = (500 \div 1000) + (45 \div 200) + (40 \div 200)$$

$$E_m = 0.500 + 0.225 + 0.200$$

$$E_m = 0.925$$

Since  $E_m$  is less than unity (1), the exposure combination is within acceptable limits.

**(5) Engineering or administrative controls.** Use engineering or administrative controls first to comply with **(1)** through **(4)** above, when feasible. When such controls are not feasible, mandate the use of protective equipment or any other protective measures to keep exposure within the limits in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. When using respirators, comply with 4/1, OAR 437-004-1040.



**NOTE:** **Bold print** identifies substances for which the Permissible Exposure Limits (PELs) are different than the federal Limits.

**TABLE Z-1 – ADOPTED VALUES (IN ALPHABETICAL ORDER)**

Substance	CAS No. <sup>(c)</sup>	ppm <sup>(a)</sup>	mg/m <sup>3</sup> <sup>(b)</sup>	Skin
<b>Abate</b>	<b>3383-96-8</b>	—	<b>10</b>	
Acetic Acid	64-19-7	10	25	
Acetone	67-64-1	1,000	2,400	
Acetonitrile	75-05-8	40	70	
<b>Acetylene</b>	<b>74-86-2</b>	<b>1,000</b>	—	
Acrolein	107-02-8	0.1	0.25	
Aldrin	309-00-2	—	0.25	X
Allyl alcohol	107-18-6	2	5	X
<b>Aluminum Metal Dust</b>	<b>7429-90-5</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
<b>Ammonia</b>	<b>7664-41-7</b>	<b>25</b>	<b>18</b>	
<b>Ammonium Chloride Fumes</b>	<b>12125-02-9</b>	—	<b>10</b>	
ANTU (Alpha-naphthyl-thiourea)	86-88-4	—	0.3	
Arsenic Organic Compounds (as As)	7440-38-2	—	.5	
Asbestos		(See OAR 437-004-9050)		
Azinphosmethyl	86-50-1	—	0.2	X
<b>Benomyl</b>	<b>17804-35-2</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Benzene See Oregon Table Z-2 for the limits applicable in the opera- tions or sectors excluded in 1910.1028 <sup>(d)</sup>	71-43-2		(See OAR 437- 004-9640)	
p-Benzoquinone, see Quinone				
Beryllium and Beryllium compounds	7440-41-7		(See Table Z-2)	
Biphenyl, see Diphenyl				
2-Butanone (MEK)	78-93-3	200	590	
2-Butoxyethanol (Butyl cello- solve)	111-76-2	50	240	X
tert-Butyl chromate (as CrO <sub>3</sub> ); see 1910.1026 <sup>9</sup>	1189-85-1			
Cadmium dust and fume (as Cd)	7440-43-9	(See 437-004-9620)		
<b>Calcium arsenate</b>	<b>7778-44-1</b>	—	<b>1</b>	
<b>Calcium carbonate</b>	<b>1317-65-3</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	

TABLE Z-1 – ADOPTED VALUES (IN ALPHABETICAL ORDER)

Substance	CAS No. <sup>(c)</sup>	ppm <sup>(a)</sup>	mg/m <sup>3</sup> <sup>(b)</sup>	Skin
Carbaryl (Sevin®)	63-25-2	—	5	
Carbon dioxide	124-38-9	5,000	9,000	
Carbon disulfide	75-15-0		(See Table Z-2)	
Carbon monoxide	630-08-0	50	55	
Carbon tetrachloride	56-23-5		(See Table Z-2)	
<b>Cellulose</b>	<b>9006-34-6</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Chlordane	57-74-9	—	0.5	X
Chlorine	7782-50-5	(C) 1	(C) 3	
Chlorobenzene	108-90-7	75	350	
1-Chloro, 2, 3-epoxypropane, see Epichlorohydrin				
<b>Chloroform (trichloromethane)</b>	<b>67-66-3</b>	<b>(C) 25</b>	<b>(C) 120</b>	
Chloropicrin	76-06-2	0.1	0.7	
Chromium (VI) compounds; see 1910.1026 <sup>h</sup>				
Chromium metal & insol. salts	7440-47-3	—	1	
Copper fume	7440-50-8	—	0.1	
Dusts and Mists	7440-50-8	—	1	
<b>Crag® herbicide (Sesone)</b>	<b>136-78-7</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Cresol (all isomers)	1319-77-3	5	22	X
Cyclohexanone	108-94-1	50	200	
2,4-D (Dichlorophenoxyacetic acid)	94-75-7	—	10	
DDT	50-29-3	—	1	X
DDVP, see Dichlorvos				
<b>Diazinon</b>	<b>333-41-5</b>	—	<b>0.1</b>	<b>X</b>
Dibrom®	300-76-5	—	3	
Dichlorodiphenyltrichloro- ethane (DDT)	50-29-3	—	1	X
Dichlorvos (DDVP)	62-73-7	0.1	1	X
Dieldrin	60-57-1	—	0.25	X
Dimethylphthalate	131-11-3	—	5	
Dinitrotoluene	25321-14-6	—	1.5	X
Dipropylene glycol methyl ether	34590-94-8	100	600	X
<b>Diquat</b>	<b>231-36-7</b>	—	<b>0.5</b>	
Endosulfan (Thiodan®)	115-29-7	—	0.1	X
Endrin	72-20-8	—	0.1	X

**TABLE Z-1 – ADOPTED VALUES (IN ALPHABETICAL ORDER)**

Substance	CAS No. <sup>(c)</sup>	ppm <sup>(a)</sup>	mg/m <sup>3</sup> <sup>(b)</sup>	Skin
<b>Ferbam</b>	<b>14484-64-1</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Formaldehyde	50-00-0		(See OAR 437-004-9760)	
Grain dust (oat, wheat, barley)		—	10	
Guthion®, see Azinphosmethyl				
<b>Gypsum</b>	<b>13397-24-5</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Heptachlor	76-44-8	—	0.5	X
Hexane (n-hexane)	110-54-3	500	1,800	
Hydrazine	302-01-2	1	1.3	X
Hydrogen sulfide	7783-06-4		(See Table Z-2)	
<b>Kaolin</b>	<b>1332-58-7</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Lead, inorganic (as Pb)	7439-92-1	(See 437-004-9600)		
<b>Limestone</b>	<b>1317-65-3</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Lindane	58-89-9	—	0.5	X
L.P.G. (Liquified petroleum gas)	68476-85-7	1,000	1,800	
<b>Malathion</b>	<b>121-75-5</b>	—	<b>10</b>	<b>X</b>
<b>Methane</b>	<b>74-82-8</b>	<b>1,000</b>	—	
<b>Methoxychlor</b>	<b>72-43-5</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
<b>Methyl bromide</b>	<b>74-83-9</b>	<b>15</b>	<b>60</b>	<b>X</b>
.....		(C) 20	(C) 80	
Methyl ethyl ketone (MEK), see 2-Butanone				
<b>Methyl mercaptan</b>	<b>74-93-1</b>	<b>0.5</b>	<b>1</b>	
.....		(C) 10	(C) 20	
<b>Methyl parathion</b>	<b>298-00-0</b>	—	<b>0.2</b>	<b>X</b>
Methylene Chloride	75-09-2		(See Table Z-2)	
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	
Nicotine	54-11-5	0.075	0.5	X
Nitrotrichloromethane, see Chloropicrin				
Paraquat respirable dust	4685-14-7/ 1910-42-5/ 2074-50-2	—	0.5	X
Parathion	56-38-2	—	0.1	X

TABLE Z-1 – ADOPTED VALUES (IN ALPHABETICAL ORDER)

Substance	CAS No. <sup>(c)</sup>	ppm <sup>(a)</sup>	mg/m <sup>3</sup> <sup>(b)</sup>	Skin
<b>Particulates not otherwise regulated (PNOR) <sup>(f)</sup></b>				
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Pentachlorophenol	87-86-5	—	0.5	X
<b>Perlite</b>	<b>93763-70-3</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Petroleum distillates (naphtha) (Rubber Solvent)		500	2,000 <sup>(g)</sup>	
Phenol	108-95-2	5	19	X
Phosdrin (Mevinphos®)	7786-34-7	0.01	0.1	X
Phosgene (carbonyl chloride)	75-44-5	0.1	0.4	
Phosphine	7803-51-2	0.3	0.4	
Phosphoric acid	7664-38-2	—	1	
Phthalic anhydride	85-44-9	2	12	
<b>Picloram</b>	<b>1918-02-1</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Portland Cement	659997-15-1			
Total Dust		—	10	
Respirable Fraction		—	5	
Propane	74-98-6	1,000	1,800	
<b>Propylene glycol monomethyl ether</b>	<b>107-98-2</b>	<b>100</b>	<b>360</b>	
Quinone	106-51-4	0.1	0.4	
<b>Ronnel</b>	<b>299-84-3</b>	—	<b>10</b>	
Rotenone	83-79-4	—	5	
Silica			(See Table Z-3)	
<b>Stoddard solvent</b>	<b>8052-41-3</b>	<b>200</b>	<b>1,150</b>	
Sulfuric acid	7664-93-9	—	1	
Systox, see Demeton®				
2, 4, 5-T	93-76-5	—	10	
TEDP (Sulfotepp)	3689-24-5	—	0.2	X
<b>Temephos</b>	<b>3383-96-8</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
TEPP (Tetraethyl pyrophosphate)	107-49-3	0.004	0.05	X
Tetrachloroethylene, see Perchloroethylene				
Thallium (soluble compounds) as Tl	7440-28-0	—	0.1	X
<b>Thiram</b>	<b>137-26-8</b>		(See 437-002-0373)	

**TABLE Z-1 – ADOPTED VALUES (IN ALPHABETICAL ORDER)**

Substance	CAS No. <sup>(c)</sup>	ppm <sup>(a)</sup>	mg/m <sup>3</sup> <sup>(b)</sup>	Skin
<b>Tin oxide</b>	<b>1332-29-2</b>			
<b>Total Dust</b>		—	<b>10</b>	
<b>Respirable Fraction</b>		—	<b>5</b>	
Toluene (toluol)	108-88-3		(See Table Z-2)	
Toxaphene, see Chlorinated camphene				
Triorthocresyl phosphate	78-30-8	—	0.1	
Turpentine	8006-64-2	100	560	
Vegetable oil mist				
Total Dust		—	10	
Respirable Fraction		—	5	
Wood Dust (non-allergenic)		—	10	
Xylene (o-, m-, p-isomers)	1330-20-7	100	435	
Zinc oxide	1314-13-2			
Total Dust		—	10	
Respirable Fraction		—	5	

**NOTE:** Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits.

**NOTE:** PNOR means “particles not otherwise regulated.”

**FOOTNOTES:**

- <sup>(a)</sup> Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees C and 760 torr.
- <sup>(b)</sup> Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.
- <sup>(c)</sup> The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound, measured as the metal, the CAS number for the metal is given - not CAS numbers for the individual compounds.
- <sup>(d)</sup> The benzene standard in 4/Z, OAR 437-004-9640 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Table Z-2 apply. See 4/Z, OAR 437-004-9640 for specific circumstances.
- <sup>(e)</sup> All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the Particulates Not Otherwise Regulated (PNOR) limit that is the same as the inert or nuisance dust limit of Table Z-3.
- <sup>(f)</sup> Usually a mixture, in general the aromatic hydrocarbon content will determine which TWA applies.
- <sup>(g)</sup> If the exposure limit in 1910.1026 is stayed or is otherwise not in effect, the exposure limit is a ceiling of 0.1 mg/m<sup>3</sup>.
- <sup>(h)</sup> See Table Z-2 for the exposure limit for any operations or sectors where the exposure limit in 1910.1026 is stayed or is otherwise not in effect.



TABLE Z-2

Substance	8-Hour Time-Weighted Average	Acceptable Ceiling Concentration	Acceptable Max. Peak Above the Acceptable Ceiling Concentration for an 8-Hour Shift		Skin
			Concentration	Maximum Duration	
Benzene <sup>(a)</sup> (Z87.4-1969)	10 ppm	25 ppm	50 ppm	10 min.	
Beryllium, and beryllium compounds (Z37.29-1970)	2 µg/m <sup>3</sup>	5 µg/m <sup>3</sup>	25 µg/m <sup>3</sup>	30 min.	
Cadmium fume <sup>(b)</sup> (Z37.5-1970)	0.1 mg/m <sup>3</sup>	0.3 mg/m <sup>3</sup>			
Cadmium dust <sup>(b)</sup> (Z37.5-1970)	0.2 mg/m <sup>3</sup>	0.6 mg/m <sup>3</sup>			
Carbon disulfide (Z37.3-1968)	20 ppm	30 ppm	100 ppm	30 min.	X
Carbon tetrachloride (Z37.17-1967)	10 ppm	25 ppm	200 ppm	5 min. in any 4 hrs	
Chromic acid and chromates (Z37.7-1971) (as CrO <sub>3</sub> ) <sup>c</sup>		0.1 mg/m <sup>3</sup>			
Ethylene dibromide (Z37.31-1970)	20 ppm	25 ppm	50 ppm	5 min.	X
Ethylene dichloride (Z37.21-1969)	50 ppm	100 ppm	200 ppm	5 min. in any 3 hrs	
Fluoride as dust (Z37.28-1969)	2.5 mg/m <sup>3</sup>				
Formaldehyde (see 1910.1048)					
Hydrogen fluoride (Z37.28-1969)	3 ppm				
Hydrogen sulfide (Z37.2-1966)		20 ppm	50 ppm	10 min. once, only if no other measurable exposure occurs	
<b>Mercury (Z37.8-1971)</b>	<b>0.05 mg/m<sup>3</sup></b>	<b>0.1 mg/m<sup>3</sup></b>			<b>X</b>
Methyl chloride (Z37.18-1969)	100 ppm	200 ppm	300 ppm	5 min. in any 3 hrs	
Methylene chloride (Z37.3-1969)	25 ppm		125 ppm	15 min.	
<b>Organo (alkyl) mercury (Z37.30-1969)</b>	<b>0.001 mg/m<sup>3</sup></b>	<b>0.01 mg/m<sup>3</sup></b>			<b>X</b>
Styrene (Z37.15-1969)	100 ppm	200 ppm	600 ppm	5 min. in any 3 hrs.	
Tetrachloroethylene (Z37.22-1967)	100 ppm	200 ppm	300 ppm	5 min. in any 3 hrs.	
<b>Toluene (Z37.12-1967)</b>	<b>100 ppm</b>	<b>300 ppm</b>	<b>500 ppm</b>	<b>10 min.</b>	
Trichloroethylene (Z37.19-1967)	100 ppm	200 ppm	300 ppm	5 min. in any 2 hrs.	

TABLE Z-2 (Continued)

Substance	8-Hour Time-Weighted Average	Acceptable Ceiling Concentration	Acceptable Max. Peak Above the Acceptable Ceiling Concentration for an 8-Hour Shift		Skin
			Concentration	Maximum Duration	
<b>Diisocyanates</b>					
Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI)	.055 mg/m .005 ppm	0.210 mg/m <sup>3</sup> 0.02 ppm			
Diphenylmethane diisocyanate (MDI)	.050 mg/m <sup>3</sup> .005 ppm	0.200 mg/m <sup>3</sup> 0.02 ppm			
Hexamethylene diisocyanate (HDI)	.035 mg/m <sup>3</sup> .005 ppm	0.140 mg/m <sup>3</sup> 0.02 ppm			
1,6 Hexamethylene diisocyanated Based Adduct (includes HDI-Biuret trimer, and other polymeric forms of HDI, including isocyanurates)	0.5 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>			
Isophorone diisocyanate (IPDI)	.045 mg/m <sup>3</sup> .005 ppm	0.180 mg/m <sup>3</sup> 0.02 ppm			
Napthalene diisocyanate (NDI)	.040 mg/m <sup>3</sup> .005 ppm	0.170 mg/m <sup>3</sup> 0.02 ppm			
Toluene diisocyanate (TDI)	.035 mg/m <sup>3</sup> .005 ppm	0.140 mg/m <sup>3</sup> 0.02 ppm			

**NOTE:** Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal limits.

**FOOTNOTES:**

- (a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the Benzene Standard, 4/Z, OAR 437-004-9640.
- (b) This standard applies to any operations on sectors for which the Cadmium Standard, 4/Z, OAR 437-004-9620, is stayed or otherwise not in effect.
- (c) This standard applies to any operations or sectors for which the exposure limit in the Chromium (VI) standard, 1910.1026, is stayed or is otherwise not in effect.

**TABLE Z-3 – MINERAL DUSTS**

Substance	mppcf <sup>(a)</sup>	mg/m <sup>3</sup>
Silica:		
Crystalline		
Quartz (respirable)	$\frac{250^{(b)}}{\% SiO_2 + 5}$	$\frac{10mg / m^3(e)}{\% SiO_2 + 2}$
Quartz (total dust)	.....	$\frac{30mg / m^3}{\% SiO_2 + 2}$
Cristobalite: Use 1/2 the value calculated from the count or mass formulae for quartz. Tridymite: Use 1/2 the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth	20	$\frac{80mg / m^3}{\% SiO_2}$
Silicates (less than 1 percent crystalline silica):		
Mica	20	
Soapstone	20	
Talc (not containing asbestos)	20 <sup>(c)</sup>	
Talc (containing asbestos) Use asbestos limit.		
Tremolite, asbestiform (see OAR 437, Div. 2/Z, 1910.1001, Asbestos).		
Portland cement	50	
Graphite (Natural)	15	
Coal Dust:		
Respirable fraction less than 5 percent SiO <sub>2</sub> )		2.4 mg/m <sup>3</sup> <sup>(e)</sup>
Coal Dust:		
Respirable fraction greater than 5 percent SiO <sub>2</sub> )		$\frac{10mg / m^3}{\% SiO_2 + 2}$
<b>Inert or Nuisance Dust:</b> <sup>(d)</sup>		
<b>Respirable fraction</b>	<b>10</b>	<b>5 mg/m<sup>3</sup></b>
<b>Total dust</b>	<b>50</b>	<b>10 mg/m<sup>3</sup></b>

**NOTE:** Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal limits.

**NOTE:** Conversion factors - mppcf x 35.3 = million particles per cubic meter = particles per c.c.

**FOOTNOTES:**

<sup>(a)</sup> Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

<sup>(b)</sup> The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods are applicable.

<sup>(c)</sup> Containing less than 1 percent quartz; if 1 percent quartz or more, use quartz limit.

# Z CHEMICAL/TOXINS

- (d) All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the Particulates Not Otherwise Regulated (PNOR) limit in Table Z-1.
- (e) Calculate both concentration and percent quartz for the application of this limit from the fraction passing a size-selector with the following characteristics:

Aerodynamic Diameter (Unit Density Sphere)	Percent Passing Selector
2 .....	90
2.5 .....	75
3.5 .....	50
5.0 .....	25
10 .....	0

The measurements under this note refer to the use of an AEC (now NRC) instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 mg/m<sup>3</sup> in the table for coal dust is 4.5 mg/m<sup>3</sup>.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.  
OR-OSHA Admin. Order 4-2001, f. 2/5/01, ef. 2/5/01.  
OR-OSHA Admin. Order 9-2001, f. 9/14/01, ef. 9/14/01.  
OR-OSHA Admin. Order 6-2006, f. 8/30/06, ef. 8/30/06.

## **437-004-9010 Fumigated Areas.**

**(1) Scope:** Covers pesticides which when applied, forms a gas to control pests.

**(2) Definitions:**

**(a)** Types of fumigants include aluminum phosphide, methyl bromide, chloropicrin, 1,3-D (Telone), dazomet, metam sodium and iodomethane.

**(b)** Types of fumigations include soil, space (warehouse), vertical storage, flat storage, tarpaulin, spot (includes grain handling equipment, empty tanks and empty silos), chamber, vehicle and rodent burrows.

**(3)** All work with fumigants must follow the instructions and precautions in the manufacturer's application manual and on the product label and MSDS.

**(4)** All entry points into fumigated interior areas must have signs that identify the area as fumigated and prohibit entry.

**(5)** Leave the signs posted according to the instructions of the manufacturer of the fumigating chemical or until the hazard resulting from the fumigation is gone, whichever is the longer time.

**(6)** After fumigation, there must be a way to aerate the fumigated area without contaminating other areas where there are employees.

**(7)** If the fumigation process requires the worker to be in the fumigated area, there must be at least one other person present to assist during an emergency. That person must have the same training and access to the same personal protective equipment as the first worker.

**(8)** Fumigation chambers or areas must not allow the toxic fumigants to escape or otherwise enter other areas where they can be hazardous to other workers.

**(9)** If the fumigant concentration can exceed 10 percent of the lower explosive limit (LEL), all electrical equipment, fittings, and connections must be vapor proof.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 9-2006, f. 9/22/06, ef. 9/22/06.



## 437-004-9050 Asbestos.

**NOTE:** Agricultural employers normally will not encounter asbestos during everyday operations. However, when working with old structures, pipe systems, boilers and other equipment, frequently asbestos is found in the insulation, flooring and other places.

**Definition. Asbestos** includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that have been chemically treated or altered.

**(1)** The employer is responsible to determine, before work begins, if any task or work assigned to workers will expose them to asbestos.

**(2)** Work that exposes employees to asbestos must comply with OAR 437-002-1001, Asbestos, except as in **(4)** below.

**(3)** You must do periodic examinations of material known to contain asbestos to assure that there is no deterioration or damage causing exposure or possible exposure.

**(a)** If you find damage or deterioration, the material must be repaired, enclosed or removed according to OAR 437-002-1910.1001.

**(4)** OAR 437-003-1926.1101 regulates worker exposure to asbestos during construction work defined in OAR 437-002-1910.12(b).

**NOTE:** For your convenience, here is the definition mentioned above from 1910.12(b).

Construction work means work for construction, alteration and/or repair, including painting and decorating.

**Examples.** For your convenience, here are some examples of possible asbestos exposure situations. This list is not complete, just some examples:

Flooring, especially tile as found in kitchens, bathrooms and milkhouses.

Insulation –

Boilers, furnaces and heating systems

Pipe systems insulation, especially those carrying hot fluid

Roofing material (older)

Chimney and stove pipe

Old style welding gloves

Brakes shoes and clutches (older)

Fireproofing material (older)

Engine compartment insulation on old tractors and equipment

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f/8/28/98, ef. 10/1/98.

## 437-004-9090 Carcinogens.

(1) The employer is responsible to determine, before work begins, if any task or work will expose employees to any of the carcinogens below.

(2) Work that exposes employees to the carcinogens below must comply with OAR 437-002-1003, Carcinogens.

4-Nitrobiphenyl	beta-Naphthylamine	beta-Propiolactone
alpha-Naphthylamine	Benzidine	2-Acetylaminoflourene
Methyl chloromethyl ether	4-Aminodiphenyl	4-Dimethylaminoazobenzene
3,3-Dichlorobenzidine	Ethyleneimine	N-Nitrosodimethylamine
bis-Chloromethyl ether		

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f/8/28/98, ef. 10/1/98.

## 437-004-9600 Lead.

(1) **Definition.** Lead means any metallic lead, all inorganic lead compounds and organic lead soaps. All other organic lead compounds are not included.

(2) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to lead.

(3) Work that exposes employees to lead must comply with OAR 437-002-1910.1025.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.  
OR-OSHA Admin. Order 9-2006, f. 9/22/06, ef. 9/22/06.

## 437-004-9620 Cadmium.

**Definition.** Cadmium means cadmium and cadmium compounds.

(1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to cadmium.

(2) Work that exposes employees to cadmium must comply with OAR 437-002-1027, Cadmium, except as in (3) below.

(3) OAR 437-003-1926.1127 regulates worker exposure to cadmium during construction work defined in OAR 437-002-1910.12(b).

**NOTE:** For your convenience, here is the definition mentioned above from 1910.12(b).

Construction work means work for construction, alteration and/or repair, including painting and decorating.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9640 Benzene.

**Definition.** Benzene (C<sub>6</sub>H<sub>6</sub>) (CAS Registry No. 71-43-2) means liquefied or gaseous benzene. It includes benzene in liquid mixtures and benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene in solid materials.

(1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to benzene.

(2) Work that exposes employees to benzene must comply with OAR 437-002-1910.1028, Benzene.

**NOTE:** This does not cover the following work situations:

(i) The storage, transportation, distribution, dispensing, sale or use of gasoline, motor fuels, or other fuels containing benzene after final discharge from bulk wholesale storage facilities. It does cover operations where workers dispense gasoline or motor fuels more than 4 hours per day in an indoor location.

(ii) The storage, transportation, distribution or sale of benzene or liquid mixtures containing more than 0.1 percent benzene in intact containers while sealed in a way to contain benzene vapors or liquid, except for 4/Z, OAR 437-004-9800 as incorporated into this section.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9650 Bloodborne Pathogens.

**Application.** This applies to all occupational exposure to blood or other potentially infectious materials defined below.

### Definitions.

**Blood** means human blood, human blood components and products made from human blood.

**Other Potentially Infectious Materials** means:

The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid with visible contamination of blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids;

Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and

HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

(1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to bloodborne pathogens.

(2) Work that exposes employees to bloodborne pathogens must comply with OAR 437-002-1910.1030, Bloodborne Pathogens.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9710 Acrylonitrile.

**Definition.** Acrylonitrile or “AN” means acrylonitrile monomer, chemical formula  $\text{CH}_2 = \text{CHCN}$ .

**Liquid AN** means AN monomer in liquid form, and liquid or semi-liquid polymer intermediates, including slurries, suspensions, emulsions, and solutions, made during the polymerization of AN.

(1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to acrylonitrile.

**(2)** Work that exposes employees to acrylonitrile must comply with OAR 437-002-1910.1045, Acrylonitrile. The scope and application of that standard is below for your convenience.

**(a) Scope and application.**

**(1)** This section applies to all occupational exposures to acrylonitrile (AN), Chemical Abstracts Service Registry No. 000107131, except as provided in paragraphs (a)(2) and (a)(3) of this section.

**(2)** This section does not apply to exposures which result solely from the processing, use, and handling of the following materials:

**(i)** ABS resins, SAN resins, nitrile barrier resins, solid nitrile elastomers, and acrylic and modacrylic fibers, when these listed materials are in the form of finished polymers, and products fabricated from such finished polymers;

**(ii)** Materials made from and/or containing AN for which objective data is reasonably relied upon to demonstrate that the material is not capable of releasing AN in airborne concentrations in excess of 1 ppm as an 8-hour time-weighted average, under the expected conditions of processing, use, and handling which will cause the greatest possible release; and

**(iii)** Solid materials made from and/or containing AN which will not be heated above 170 degrees F during handling, use, or processing.

**(3)** An employer relying upon exemption under paragraph (a)(2)(ii) shall maintain records of the objective data supporting that exemption, and of the basis of the employer's reliance on the data, as provided in paragraph (q) of this section.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9720 Thiram.

**(1) Scope and application.**

**(a)** These rules apply where worker exposure to thiram may occur during manufacture, storage, packaging, tree application, treated seedling handling, or use of thiram or thiram treated seedlings.

**(b)** These rules apply to the transportation of thiram or thiram treated trees except to the extent that the U. S. Department of Transportation may regulate the hazards covered by these rules.

**(2) Definitions.**

**Clean** – The absence of dirt or materials that may be harmful to a worker's health.

**Large seedlings** – Seedlings long enough or wide enough that during normal planting avoiding mouth of face contact with the thiram treated plant is difficult.

## **(3) General requirements.**

### **(a) Permissible exposure limits.**

- (A)** Do not expose workers to thiram at atmospheric concentrations more than 0.15 mg/m<sup>3</sup> over any 8-hour period; and
- (B)** Do not expose workers to thiram at atmospheric concentrations more than 0.30 mg/m<sup>3</sup> averaged over any period not longer than 15 minutes.
- (C)** Workers must not work more than 5 days in any 7-day period with or around thiram or thiram treated seedlings.
- (D)** Paragraph **(3)(a)(C)** above is not applicable if there is a specific thiram control program, beyond these rules and approved by the Administrator.

### **(b) Washing and worker hygiene.**

- (A)** Workers must wash their hands before eating or smoking and when done working.
- (B)** At fixed work sites or planting units, provide warm (at least 85 degrees F, 29.4 degrees C) wash water and single use hand wiping materials for washing.
- (A)** Where warm water is not available within, or the means to access within, a 15 minutes travel time, provide clean water, soap and single-use towels.
- (B)** Advise every planter or nursery worker to bathe or shower daily.
- (C)** Wash or vacuum and wipe down the inside of crummies or other worker carrying vehicles at least weekly during thiram use.

### **(c) Personal protective measures.**

- (A)** Workers must wear clothing that reduces skin contact with thiram on the legs, arms and torso.
- (B)** For those workers with thiram skin irritations, protect exposed areas with a suitable barrier cream.
- (C)** Workers may wear only impervious gloves.
- (D)** Workers' hands must be clean of thiram before placing them into gloves.
- (E)** Provide nursery applicators with approved respirators, disposable coveralls or rubber slickers or other impervious clothing, rubberized boots, head covers and rubberized gloves. They must use the respirators according to 4/I, OAR 437-004-1040, Respiratory Protection.

**(A)** Other than applicators, nursery workers who may suffer thiram exposure must have and use disposable coveralls or rubber slickers or other impervious clothing, impervious footwear and gloves, and head covers unless they use showers that comply with 4/J, OAR 437-004-1105, Sanitation.

**(B)** Provide eye protection that complies with 4/I, OAR 437-004-1035. Workers exposed to thiram such as during spraying, plug bundling, belt line grading and plugging or other operations must wear this eye protection.

**(d) Respiratory protection.**

**(A)** When worker exposure is more than the Permissible Exposure Limit (PEL), provide them with applicable, certified respiratory protection approved by NIOSH.

**(B)** Use and maintain respirators according to 4/I, OAR 437-004-1041, Respiratory Protection.

**(C)** Workers must wear respirators when planting large seedlings to avoid mouth and face contact with the thiram treated plant unless they use equally effective measures or planting practices.

**(e) Food handling.**

**(A)** Do not store or consume food, snacks, beverages, smoking materials, or any similar items in the packing area of the nursery.

**(B)** Crummies or other worker carrying vehicles must have a clean area for carrying lunches.

**(C)** The clean area of the vehicle must be above from the floor and not used to carry other than food or other consumable items.

**(D)** Do not carry lunches, food or other consumable items in tree planting bags.

**(E)** Minimize or eliminate worker exposure to thiram spray, including downwind driftings.

**(F)** Workers must stand upwind when burning bags that contained thiram or thiram treated seedlings.

**(f) Thiram use and handling.**

**(A)** Nurseries must develop a quality control program approved by the Administrator to ensure that they apply only the minimum amount of thiram necessary to achieve the desired anti-browsing results to the tree seedlings.

**(B)** Thiram treated seedlings must set between the time of spraying and packing.

(C) Keep seedlings moist during packing and when possible during planting.

(D) Vacuum or wash floors daily where thiram is used, do not sweep them.

(E) Remove silica chips covering seedling plugs at the nursery.

**(g) Labeling.**

(A) Rules enforced by the Oregon Department of Agriculture, or the U.S. Environmental Protection Agency (EPA), about the labeling of thiram treated seedlings, apply.

(B) If the Oregon Department of Agriculture, or EPA, has no thiram labeling rules, each container, bundle or wrapping of thiram treated seedlings must have a clearly legible and visible tag or label, of waterproof material and printing, on which is the following in English and Spanish:

### CAUTION

These seedlings are treated with an animal repellent containing Thiram (tetra-methyl thiuram disulfide) that may flake off during handling. Consumption of alcoholic beverages or use of alcohol-base creams or lotions during a time span from 12 hours before to 7 days after exposure to Thiram may result in nausea, headache, vomiting, fatigue, or flushness. Exposure to Thiram may also cause irritation of the eyes, nose, throat, or skin.

Thiram may interfere with or render ineffective medications taken by epileptics or heart patients with blood-clotting difficulties. Animal studies at very high concentrations (more than 250 mg/kg) suggest that Thiram may cause birth defects.

### SAFETY PRECAUTIONS

1. Keep treated seedlings moist.
2. Wear clothing to reduce skin contact with Thiram to the legs, arms and torso.
3. A fiber or cloth face mask (respirator) may be worn at the planter's discretion, except that when planting large seedlings, you must wear a respirator to avoid mouth and face contact with thiram treated plants, unless you use equally effective measures
4. Wash exposed skin areas thoroughly after handling treated seedlings and before smoking, drinking, eating or going to the bathroom.
5. If Thiram flakes contact eyes, immediately flush eyes freely with water.
6. Bathe daily and change work clothes at least every other day.

## PRECAUCION

Estas plantas han sido tratadas con un replente contra animales que tiene la substancia Thiram (tetramethyl thiuram disulfide) que puede desaparecer en manoseo. La consuncion de bebidas alcoholicas o el uso de cremas o lociones con base de alcohol dentro de 12 horas antes de ser expuesto o hasta 7 dias despues de ser expuesto a Thiram puede resultar en sintomas de nausea, dolor de cabeza, vomito, faiga o rubor. Contacto con Thiram puede causar irritacion de los ojos, nariz, garganta o piel.

Thiram puede interferir o desvalidar en completa las medicinas de los epilepticos o personas con condiciones de la corazon con dificultades de coagulacion de la sangre. Estudios con animals en concentraciones muy altas (mas que 250 mg/kg) indican que Thiram puede causar desformaciones fetales. Sin que cuando se sembra plantas de semillas grandes macaras estaran requerido a evitar contacto con la boca y la cara con plantas tratado con Thiram excepto cuando otros metodos igualmente efecaz estarah usados.

## MEDIAS DE PRECAUCION

1. Guardar mojados las platas siempre.
2. El trabajador necesita usar ropa para reducir el contacto de Thiram con las piernas, brazos, y el torso.
3. Una mascara de fibre o garra (mascara) se puede usar a la discrecion del plantador.
4. Lavese bien los parten expuestos cuando trate los semillos antes de fumar, tomar, comer e ir al bano.
5. Se acaso el Thiram cae en sus ojos, inmediatamente lavese los ojos libremente con agua.
6. Banese todos los dias y cambiese de ropa de trabajo por lo menos cada otro dia.

**(C)** Other containers or thiram handling areas must have signs and labels that comply with 4/J, OAR 437-004-1150 and 1180.

### **(h) Training.**

**(A)** Where exposures to thiram may occur, train each worker about the hazards of thiram and precautions for its safe use and handling.

**(B)** The training must be approved by the Administrator.

(C) The training must include:

- (i) The health hazard(s) of chronic exposure to thiram including the potential for birth defects, alcohol intolerance, and drug interaction.
- (ii) The specific nature of work that could result in exposure to thiram and the necessary protective steps;
- (iii) The purpose for, proper use, and limitations of protective devices including respirators and clothing;
- (iv) The acute toxicity and skin irritation effects of thiram, and the necessary protective steps;
- (v) The need for and requirements of excellent personal hygiene;
- (vi) A review of the thiram rules at the worker's first training and indoctrination, and annually thereafter.

(D) Give each worker a copy of these thiram rules.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.  
OR-OSHA Admin. Order 9-2006, f. 9/22/06, ef. 9/22/06.

## 437-004-9740 Ethylene Oxide.

**Definition.** "Ethylene oxide" or "EtO" means the three-membered ring organic compound with chemical formula  $C_2H_4O$ .

- (1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to ethylene oxide.
- (2) Work that exposes employees to ethylene oxide must comply with OAR 437-002-1047, Ethylene Oxide.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9760 Formaldehyde.

**Definition.** Formaldehyde means the chemical substance (HCHO) (CAS Registry No. 50-00-0).

- (1) The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to formaldehyde.

**(2)** Work that exposes employees to formaldehyde must comply with OAR 437-002-1910.1048, Formaldehyde.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## **437-004-9780 Methyleneedianiline.**

**Definition. 4,4' Methyleneedianiline or MDA** means the chemical, 4,4'-diaminodiphenylmethane, Chemical Abstract Service Registry number 101-77-9, in the form of a vapor, liquid, or solid. The definition also includes the salts of MDA.

**(1)** The employer is responsible to determine, before work begins, if any task or work assigned will expose employees to Methyleneedianiline.

**(2)** Work that exposes employees to Methyleneedianiline must comply with OAR 437-002-1910.1050, Methyleneedianiline.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## **437-004-9800 Hazard Communication.**

### **(1) Purpose.**

**(a)** This is to ensure that employers and employees know the hazards of chemicals where they work through a comprehensive hazard communication program, including container labeling and other warnings, material safety data sheets and training.

**(b)** This covers evaluation of the potential hazards of chemicals, and the communication of information about hazards and protective measures to workers. It preempts any legal requirements of a state, or political subdivision of a state, about this subject. This standard requires as a minimum: developing and maintaining a written hazard communication program, keeping a list of hazardous chemicals; labeling of containers of chemicals; preparation and distribution of material safety data sheets to workers; and development and use of worker training programs about hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

**NOTE:** This subdivision was scaled down to exclude parts covering manufacturers of chemicals. On occasion, agricultural employers engage in activities that fit the definition of "produce" in this standard. If you do, you must get OAR 437-002-1910.1200, Hazard Communication, and follow the standards for manufacturers and producers of chemicals.

In the definition of “produce” you find the term “blend.” If you mix or blend chemicals and the resultant mixture has no new hazardous characteristics, you can use the MSDS sheets for the ingredients and you are not a producer or manufacturer. However, if the “blend” creates a new set of hazards, you have become a manufacturer and need to follow the above paragraph.

## (2) Scope and application.

(a) Employers must inform their workers about hazardous chemicals by using a hazard communication program, labels, material safety data sheets, information and training.

(b) This applies to any chemical known to be in the workplace in a way that may expose workers under normal conditions of use or in a foreseeable emergency.

(c) Agricultural employers with laboratories, doing other than do quality control or quality assurance work, must comply with OAR 437-002-1910.1200 and 1910.1450.

(d) Where workers only handle chemicals in unopened sealed containers, this section applies only as follows:

(A) Do not allow removal or defacing of labels on incoming containers of hazardous chemicals;

(B) Keep copies of material safety data sheets received with incoming shipments of the sealed containers of hazardous chemicals. Get a material safety data sheet as soon as possible for sealed containers of hazardous chemicals received without one if an employee requests the material safety data sheet. Material safety data sheets must be readily accessible at all times to all employees; and,

(C) Give employees information and training that complies with **OAR 437-004-9800(7)** (except for the location and availability of the written hazard communication program under **OAR 437-004-9800(7)(d)(C)**), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(e) This section does not require labeling of the following chemicals:

(A) Any pesticide defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(B) Any chemical substance or mixture defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(C) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g., flavors and fragrances), defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

**(D)** Any distilled spirits (beverage alcohols), wine, or malt beverage intended for non-industrial use, defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, and Firearms;

**(E)** Any consumer product or hazardous substance defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

**(F)** Agricultural or vegetable seed treated with pesticides and labeled according to the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

**(f)** This section does not apply to:

**(A)** Any hazardous waste defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

**(B)** Any hazardous substance defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.), when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA according to Environmental Protection Agency regulations;

**(C)** Tobacco or tobacco products;

**(D)** Wood or wood products, including lumber that will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (not exempt are wood or wood products treated with a hazardous chemical covered by this standard, and wood that may later be sawed or cut, generating dust);

**(E)** Articles (defined in **OAR 437-004-9800(3)**);

**(F)** Food or alcoholic beverages sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while at work;

**(G)** Any drug, defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while at work (e.g., first aid supplies);

(H) Any consumer product or hazardous substance, defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure not more than the range of exposures that could reasonably be experienced by consumers;

(I) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

(J) Ionizing and non-ionizing radiation; and,

(K) Biological hazards.

### (3) Definitions.

**Agricultural employer** – see 4/B, OAR 437-004-0100.

**Article** means a manufactured item other than a fluid or particle:

(i) Formed to a specific shape or design during manufacture;

(ii) With end use function(s) dependent in whole or in part on its shape or design during end use; and

(iii) Which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical and does not pose a physical hazard or health risk to employees.

**Administrator** is the Administrator of the Oregon Occupational Safety and Health Division, or their designee.

**Chemical** is any element, chemical compound or mixture of elements and/or compounds.

**Chemical manufacturer** is an employer with a workplace where chemical(s) are made for use or distribution.

**Chemical name** is the scientific designation of a chemical according to the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name that clearly identifies the chemical for the purpose of conducting a hazard evaluation.

**Combustible liquid** – see 4/B, OAR 437-004-0100, Universal Definitions.

**Commercial account** is an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

**Common name** means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

**Compressed gas:**

- (i) A gas or mixture of gases with, in a container, an absolute pressure more than 40 psi at 70 degrees F (21.1 degrees C); or
- (ii) A gas or mixture of gases with, in a container, an absolute pressure more than 104 psi at 130 degrees F (54.4 degrees C) regardless of the pressure at 70 degrees F (21.1 degrees C); or
- (iii) A liquid with a vapor pressure exceeding 40 psi at 100 degrees F (37.8 degrees C) as determined by ASTM D-323-72.

**Container** is any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. Pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

**Designated representative** is any individual or organization to whom an employee gives written authorization to exercise such employee's rights. A recognized or certified collective bargaining agent is automatically a designated representative without regard to written employee authorization.

**Distributor** means a business, other than a chemical manufacturer or importer, that supplies hazardous chemicals to other distributors or to employers.

**Employee** is a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in nonroutine, isolated instances are not covered.

**Employer** is a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

**Explosive** is a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

**Exposure** or **exposed** means an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g., accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g., inhalation, ingestion, skin contact or absorption).

**Flammable** is a chemical that falls into one of the following categories:

- (i) **Aerosol, flammable** is an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection more than 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) **Gas, flammable** means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit;

(iii) **Liquid, flammable** – see 4/B, OAR 437-004-0100, Universal Definitions.

(iv) **Solid, flammable** is a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or that can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical is a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

**Flashpoint** is the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 degrees F (37.8 degrees C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (See American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or more than 45 SUS at 100 degrees F (37.8 degrees C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).

Organic peroxides, that undergo auto accelerating thermal decomposition, are excluded from any of the flashpoint determination methods above.

**Foreseeable emergency** means any potential event such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that could result in an uncontrolled release of a hazardous chemical into the workplace.

**Hand-labor operations** is field work done by hand or with hand tools. This includes the cultivation, weeding, planting, and harvesting of crops, including mushrooms, and the packing of produce into containers, whether done on the ground, on a moving machine, or in a temporary packing shed in the field.

**Hazardous chemical** is any chemical that is a physical hazard or a health hazard.

**Hazard warning** means any words, pictures, symbols, or combination appearing on a label or other appropriate form of warning that convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for “physical hazard” and “health hazard” to determine the hazards which must be covered.)

**Health hazard** is a chemical for which there is statistically significant evidence based on at least one study conducted according to established scientific principles that acute or chronic health effects may occur in exposed employees. The term “health hazard” includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes. Appendix A gives more definitions and explanations of the scope of health hazards covered by this section. Appendix B describes the criteria for determining whether or not a chemical is hazardous for purposes of this standard.

**Identity** is any chemical or common name that is on the material safety data sheet (MSDS) for the chemical. The identity must allow cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.

**Immediate use** means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

**Importer** is the first business with employees within the Customs Territory of the United States that receives hazardous chemicals made in other countries for the purpose of supplying them to distributors or employers within the United States.

**Label** is any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

**Material safety data sheet (MSDS)** is written or printed material about a hazardous chemical prepared according to **OAR 437-004-9800(6)**.

**Mixture** means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

**Organic peroxide** is an organic compound that has the bivalent -O-O-structure and may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

**Oxidizer** is a chemical other than a blasting agent or explosive as defined in §1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

**Physical hazard** is a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

**Produce** means to manufacture, process, blend, extract, generate, emit, formulate, or repackage.

**Pyrophoric** is a chemical that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

**Responsible party** is someone who can give additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

**Specific chemical identity** is the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

**Trade secret** is any confidential formula, pattern, process, device, information or compilation of information used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

**Unstable (reactive)** is a chemical that in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

**Use** means to package, handle, react, emit, extract, generate as a by-product, or transfer.

**Water-reactive** is a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

**Work area** is a room or defined space in a workplace where hazardous chemicals are made or used, and where there are employees.

**Workplace** is an establishment, job site, or project, at one geographical location with one or more work areas.

#### **(4) Written hazard communication program.**

**(a)** Employers must implement an effective written hazard communication program that describes how they will meet, at least, the criteria in **OAR 437-004-9800(4), (5), and (6)** for labels and other forms of warning, material safety data sheets, and employee information and training. This program must be specific to each of the employer's workplaces. It also must have:

**(A)** A list of the hazardous chemicals in the workplace using an identity referenced on the appropriate material safety data sheet (the list may be for the whole workplace or for individual work areas); and,

**(B)** The methods the employer will use to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals in unlabeled pipes in their work areas.

**(b) Multi-employer workplaces.** Employers who use or store hazardous chemicals in a way that may expose the employees of other employer(s) must also ensure that their hazard communication programs include:

**(A)** The methods the employer will use to make material safety data sheets for each hazardous chemical available to other employers with employees on the site exposed to the hazards;

**(B)** The methods the employer will use to inform the other employer(s) of any precautionary measures needed to protect employees during normal operating conditions and foreseeable emergencies; and,

**(C)** The methods the employer will use to inform the other employer(s) of the labeling system in use.

**(c)** The employer may rely on an existing hazard communication program to comply with these requirements, if it complies with **OAR 437-004-9800(4)**.

**(d)** The employer must make the written hazard communication program available, on request, to employees, their designated representatives, the Administrator, according to the requirements of OAR 437-002-1910.1020(e).

**(e)** Where employees work at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

**(5) Labels and other forms of warning.**

**(a)** Chemical manufacturers, importers and distributors have responsibilities for labeling products that you use and for giving those labels to you. Consult OAR 437-002-1910.1200(f), Labels and Other Forms of Warnings, for details.

**(b)**

**(A)** For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempt as articles due to their downstream use, or shipments of whole grain, the label may come with the initial shipment, and need not come with subsequent shipments to the same employer unless the information on the label changes;

**(B)** The label may come with the initial shipment itself, or with the material safety data sheet that comes prior to or with the first shipment; and,

**(C)** This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself. It does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example pesticides in grains).

(c) If the hazardous chemical is regulated by OR-OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer must ensure that the labels or other forms of warning comply with that standard.

(d) Except as in (5)(e) and (5)(f) below, the employer must ensure that each container of hazardous chemicals is labeled, tagged or marked with this information:

(A) Identity of the hazardous chemical(s); and,

(B) Appropriate hazard warnings, words, pictures, symbols, or combination of them, that provide at least general information about the hazards of the chemicals, and which, with other information immediately available to employees, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

(e) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other written materials instead of labels on individual stationary process containers, if the alternative method identifies the containers to which it is applicable and conveys the information required by (5)(d) above to be on a label. The written materials must always be readily accessible to the employees in their work area.

(f) Labels are not necessary on portable containers of hazardous chemicals intended only for use during the work shift by the employee who fills them.

(g) Incoming containers of hazardous chemicals must have labels that are legible and contain the information originally provided by the manufacturer or distributor.

(h) The employer must ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or always readily available in the work area. Employers with employees who speak other languages may add the information in their language, as long as it is also in English.

(i) The employer need not affix new labels if existing labels already give the required information.

(j) Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information about the hazards of a chemical must revise the labels for the chemical within 3 months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time must have the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importer, distributor, or employer must add the information to the label before the chemical is shipped again.

## (6) Material safety data sheets (MSDS).

(a) Employers must have a material safety data sheet (MSDS) for each hazardous chemical they use. These sheets may be kept electronically.

**(b)** Material safety data sheets must be in English (although the employer may maintain copies in other languages as well), and have at least the following information:

**(A)** The identity used on the label, and, except as in **OAR 437-004-9800(8)** on trade secrets:

**(i)** If the hazardous chemical is a single substance, its chemical and common name(s);

**(ii)** If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or,

**(iii)** If the hazardous chemical is a mixture that has not been tested as a whole:

**(I)** The chemical and common name(s) of all ingredients known to be health hazards, and that are 1 percent or more of the composition, except that chemicals identified as carcinogens under paragraph (d) must be listed if the concentrations are 0.1 percent or more; and,

**(II)** The chemical and common name(s) of all ingredients known to be health hazards, and that are less than 1 percent (0.1 percent for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations more than an established OR-OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees; and,

**(III)** The chemical and common name(s) of all ingredients known to present a physical hazard when present in the mixture;

**(B)** Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

**(C)** The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

**(D)** The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions generally recognized as being aggravated by exposure to the chemical;

**(E)** The primary route(s) of entry;

**(F)** The OR-OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

**(G)** Whether the hazardous chemical is in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OR-OSHA;

**(H)** Any generally applicable precautions for safe handling and use known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

**(I)** Any generally applicable control measures known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

**(J)** Emergency and first aid procedures;

**(K)** The date of preparation of the material safety data sheet or the last change to it; and,

**(L)** The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

**(c)** If no relevant information is found for any given category on the material safety data sheet, it must state that no applicable information was found.

**(d)** Where complex mixtures have similar hazards and contents (i.e., the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

**(e)** The chemical manufacturer, importer or employer preparing the material safety data sheet must ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information must be added to the material safety data sheet within 3 months. If the chemical is not currently being produced or imported the chemical manufacturer or importer must add the information to the material safety data sheet before the chemical is distributed again.

**(f)**

**NOTE:** Chemical manufacturers, importers and distributors have obligations to provide material safety data sheets. Employers also have obligations to get them when the source fails to automatically provide them. There are also requirements for retail distributors. Should you have trouble getting an MSDS, check OAR 437-002-1910.1200 for details on these requirements.

**(g)** The employer must keep copies of the required material safety data sheets (MSDS) for each hazardous chemical during its use or presence in the workplace, even residual chemicals encountered by workers doing field hand-labor. They must always be readily accessible to all employees.

**Note:** Electronic access and other alternatives to paper copies of the material safety data sheets are acceptable if employees have immediate access to them.

**(h)** Where employees work at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. The employer must ensure that employees can immediately get the required information in an emergency.

**(i)** Material safety data sheets may be in any form, including operating procedures, and may cover groups of hazardous chemicals when it is better to address the hazards of a process rather than individual hazardous chemicals. However, the employer must ensure that the required information is always provided for each hazardous chemical, and is always readily accessible to employees.

**(j)** Material safety data sheets must also be readily available, upon request, to designated representatives and to the Administrator, in compliance with OAR 437-002-1910.1020.

## **(7) Employee information and training.**

**(a)** Give employees effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and when a new physical or health hazard is introduced into their work area. Information and training may cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets. Agricultural employees who mix, load, apply, or otherwise handle hazardous chemicals must get all information and training required by this standard.

**(b)** Inform employees of:

**(A)** The requirements of this section;

**(B)** Any operations in their work area where hazardous chemicals are present; and,

**(C)** The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets.

**(c)** Employee training must include at least:

**(A)** Methods and observations to detect the presence or release of a hazardous chemical in the work area (such as monitoring done by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

**(B)** The physical and health hazards of the chemicals in the work area;

**(C)** The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment; and,

**(D)** The details of the hazard communication program including an explanation of the labeling system and the material safety data sheet, and how employees can get and use the right hazard information.

**(d)** Agricultural employers must give all of their employees the OR-OSHA brochure, "Safe Practices When Working Around Hazardous Agricultural Chemicals."

**(e)** For employees doing only hand-labor where there is potential exposure to pesticides, giving them the brochure, information about the location and availability of Material Safety Data Sheets (MSDS), and assuring employee access to Material Safety Data Sheet information meets the training and information requirements of this standard.

**(8) Trade secrets.** There are special standards about the relationship of this standard to trade secrets. If those circumstances apply, follow OAR 437-002-1900.1200(i) and its Appendix D.

**(9) Subpoenas, citations, penalties.**

**(a)** The Oregon Occupational Safety and Health Division has the authority under ORS Chapter 654 to issue a subpoena or any protective orders.

**(b)** Agency actions under ORS Chapter 654 and these rules are enforceable by the issuance of additional citations and penalties pursuant to ORS 654.071(4), ORS 654.086(1)(d), or ORS 654.086(3). The Oregon Occupational Safety and Health Division may refer the matter to the Circuit Court in the county in which the proceedings are pending for enforcement of the subpoena.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## Appendix A to 437-004-9800

### Health Hazard Definitions (Mandatory)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g., flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body – like decreased pulmonary function. These changes generally are indicated by signs and symptoms in the exposed employees – such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be informed of both the change in body function and the signs and symptoms that may occur to signal that change.

Complicating the identification of occupational health hazards is the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to discover that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is complicated more by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

There have been many attempts to categorize effects and to define them in various ways. Generally, the terms “acute” and “chronic” delineate between effects on the basis of severity or duration. “Acute” effects usually occur rapidly as a result of short-term exposures, and are of short duration. “Chronic” effects generally occur as a result of long-term exposure, and are of long duration.

The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling of Hazardous Industrial Chemicals (Z129.1-1982) – irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects that may occur from occupational exposure, such as, for example, narcosis.

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obviously a concern in the workplace, but again, do not adequately cover the area of chronic effects, excluding, for example, blood dyscrasias (such as anemia), chronic bronchitis and liver atrophy.

The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them. Appendix B, which is also mandatory, outlines the principles and procedures of hazard assessment.

For purposes of this section, any chemicals that meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards. However, this is not intended to be an exclusive categorization scheme. If there are available scientific data that involve other animal species or test methods, they must also be evaluated to determine the applicability of the HCS.

- 1. Carcinogen:** A chemical is a carcinogen if:
  - (a)** It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
  - (b)** It is a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or,
  - (c)** OSHA regulates it as a carcinogen.
  
- 2. Corrosive:** A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S. Department of Transportation in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.
  
- 3. Highly toxic:** A chemical in any of the following categories:
  - (a)** A chemical with a median lethal dose (LD<sub>50</sub>) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
  - (b)** A chemical with a median lethal dose (LD<sub>50</sub>) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
  - (c)** A chemical with a median lethal concentration (LC<sub>50</sub>) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for 1-hour (or less if death occurs within 1-hour) to albino rats weighing between 200 and 300 grams each.
  
- 4. Irritant:** A chemical, that is not corrosive, but causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for 4 hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

- 5. Sensitizer:** A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.
- 6. Toxic.** A chemical falling within any of the following categories:
- (a)** A chemical with a median lethal dose ( $LD_{50}$ ) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
  - (b)** A chemical with a median lethal dose ( $LD_{50}$ ) of more than 200 milligrams per kilo- gram but not more than 1,000 milligrams per kilogram of body weight when adminis- tered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
  - (c)** A chemical with a median lethal concentration ( $LC_{50}$ ) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for 1-hour (or less if death occurs within 1-hour) to albino rats weighing between 200 and 300 grams each.
- 7. Target organ effects.** The following is a target organ categorization of effects that may occur, including examples of signs and symptoms and chemicals that cause such effects. These examples illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but are not all-inclusive.
- a. Hepatotoxins:** Chemicals that produce liver damage  
Signs & Symptoms: Jaundice; liver enlargement  
Chemicals: Carbon tetrachloride; nitrosamines
  - b. Nephrotoxins:** Chemicals that produce kidney damage  
Signs & Symptoms: Edema; proteinuria  
Chemicals: Halogenated hydrocarbons; uranium
  - c. Neurotoxins:** Chemicals that produce their primary toxic effects on the nervous system  
Signs & Symptoms: Narcosis; behavioral changes; decrease in motor functions  
Chemicals: Mercury; carbon disulfide

**d. Agents which act on the blood or hematopoietic system:** Decrease hemoglobin function; deprive the body tissues of oxygen

Signs & Symptoms: Cyanosis; loss of consciousness

Chemicals: Carbon monoxide; cyanides

**e. Agents which damage the lung:** Chemicals that irritate or damage pulmonary tissue

Signs & Symptoms: Cough; tightness in chest; shortness of breath

Chemicals: Silica; asbestos

**f. Reproductive toxins:** Chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)

Signs & Symptoms: Birth defects; sterility

Chemicals: Lead; DBCP

**g. Cutaneous hazards:** Chemicals that affect the dermal layer of the body

Signs & Symptoms: Defatting of the skin; rashes; irritation

Chemicals: Ketones; chlorinated compounds

**h. Eye hazards:** Chemicals that affect the eye or visual capacity

Signs & Symptoms: Conjunctivitis; corneal damage

Chemicals: Organic solvents; acids

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## Appendix B to 437-004-9800

### Hazard Determination (Mandatory)

The quality of a hazard communication program depends on the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance-oriented. Chemical manufacturers, importers, and employers evaluating chemicals do not have to follow any specific methods for determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported according to the criteria in this Appendix.

Hazard evaluation relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance orientation of the hazard determination does not diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, use the following criteria in making hazard determinations that meet the requirements of this standard.

- 1. Carcinogenicity:** As described in paragraph **OAR 437-004-9800(d)(4)** and Appendix A, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen is conclusive evidence for purposes of this section. Also, however, all available scientific data on carcinogenicity must be evaluated according to this Appendix and the requirements of the rule.
- 2. Human data:** Where available, consider epidemiological studies and case reports of adverse health effects in the evaluation.
- 3. Animal data:** Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations must be used to predict the possible health effects for exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).
- 4. Adequacy and reporting of data.** The results of any studies designed and conducted according to established scientific principles, and that report statistically significant conclusions regarding the health effects of a chemical, are a sufficient basis for a hazard determination and reported on any material safety data sheet. *In vitro* studies alone generally do not form the basis for a definitive finding of hazard under the HCS since they have a positive or negative result rather than a statistically significant finding.

The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.



## Appendix C to 437-004-9800

### Guidelines for Employer Compliance (Advisory)

The basis of the Hazard Communication Standard (HCS) is the simple concept that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to at work. They also need to know what protective measures are available to prevent adverse effects. Compliance with the HCS gives employees the information they need.

The HCS covers the issues of evaluating and communicating hazards to workers. Evaluation of chemical hazards involves a number of technical concepts, and is a process that requires the professional judgment of experienced experts. That is why the HCS is designed so that employers who simply use chemicals, rather than produce or import them, do not have to evaluate the hazards of those chemicals. Hazard identification is the responsibility of the producers and importers of the materials. Producers and importers of chemicals then have to give the hazard information to employers that purchase their products.

Employers that do not produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. We have left out some parts of the original federal standard because Oregon agricultural employers seldom manufacture their own chemicals or otherwise do things that would make it necessary to comply with the parts we have left out. This appendix is a general guide for employers to help them determine what is required under the rule. It does not substitute for the regulation, but is a simplified outline of the steps an average employer would follow to comply.

#### 1. Becoming Familiar With The Rule.

OR-OSHA has a simple summary of the HCS in a pamphlet called "Developing Your Haz-com Program," OR-OSHA Publication Number 2034. Order a free copy from the OR-OSHA Resource Center at (503) 947-7447.

You may find that you are already mostly complying with parts of this standard and will simply have to modify your existing programs.

The standard's design is simple. Chemical manufacturers and importers must evaluate the hazards of the chemicals they produce or import. Using that information, they must then make labels for containers, and more detailed technical bulletins called material safety data sheets (MSDS).

Chemical manufacturers, importers, and distributors of hazardous chemicals must give the appropriate labels and material safety data sheets to the employers to which they ship the chemicals. The information must be given automatically. Every container of hazardous chemicals you get must have a label, tag or markings with the required information. Your suppliers must also send you a properly completed material safety data sheet (MSDS) at the time of the first shipment of the chemical, and with the next shipment after the MSDS is updated with new and significant information about the hazards.

You can rely on the information received from your suppliers. You have no independent duty to analyze the chemical or evaluate the hazards of it.

Employers that “use” hazardous chemicals must have a program to ensure the information is given to exposed employees. “Use” means to package, handle, react, or transfer. This is an intentionally broad scope, and includes any situation where a chemical is present in such a way that employees may be exposed under normal conditions of use or in a foreseeable emergency. For agriculture, this is in addition to all other standards’ requirements.

The requirements of the rule that deal specifically with the hazard communication program are in this section in paragraphs (4), written hazard communication program; (5), labels and other forms of warning; (6), material safety data sheets; and (7), employee information and training. The requirements of these paragraphs should be the focus of your attention. Concentrate on becoming familiar with them, using paragraphs (2), scope and application, and (3), definitions, as references to help explain things.

There are two types of work where the coverage of the rule is limited. These are laboratories and operations where chemicals are only handled in sealed containers (e.g., a warehouse). The limited provisions for these workplaces can be found in paragraph (2), scope and application. Basically, employers with these types of work operations need only keep labels on containers as they are received; maintain material safety data sheets and give employees access to them; and provide information and training for employees. Employers do not have to have written hazard communication programs and lists of chemicals for these types of operations.

## **2. Identify Responsible Staff.**

Hazard communication is going to be a continuing program for you. Compliance with the HCS is not a “one shot deal.” To have a successful program, it is necessary to assign responsibility for both the initial and ongoing activities that have to be done to comply with the rule. Sometimes, these activities may already be part of current job assignments. Early identification of the responsible employees, and involvement of them in the development of your plan will result in a more effective program design.

For any safety and health program, success depends on commitment at every level of the organization. This is particularly true for hazard communication, where success requires a change in behavior. This will only happen if employers understand the program, are committed to its success and motivate the workers.

### 3. Identify Hazardous Chemicals in the Workplace.

The standard requires a list of hazardous chemicals in the workplace as part of the written hazard communication program. The list will eventually serve as an inventory of everything for which you need an MSDS. Preparing the list will help you complete the rest of the program since it will give you some idea of the scope of the program required for compliance in your facility.

The best way to prepare a comprehensive list is to survey the workplace. Purchasing records may also help, and certainly employers should establish procedures to ensure that, in the future, purchasing procedures result in MSDSs being received before a material is used in the workplace.

Take the broadest possible perspective when doing the survey. Sometimes people think of “chemicals” as being only liquids in containers. The HCS covers chemicals in all physical forms – liquids, solids, gases, vapors, fumes, and mists whether they are “contained” or not. The hazardous nature of the chemical and the potential for exposure are the factors that determine whether a chemical is covered. If it is not hazardous, it is not covered. If there is no potential for exposure (e.g., the chemical is bound and cannot be released), the rule does not cover the chemical.

Look around. Identify chemicals in containers, including pipes, but also think about chemicals produced by the work. For example, welding fumes, dust, and exhaust fumes are all sources of chemical exposures. Read labels provided by suppliers for hazard information. Make a list of all chemicals in the workplace that are potentially hazardous. For your own information and planning, you may want to note on the list the location(s) of the products and an indication of the hazards as found on the label. This will help you as you prepare the rest of your program.

Paragraph (2), scope and application, includes exemptions for various chemicals or work situations. After compiling the complete list of chemicals, you should review paragraph (2) to determine if you can eliminate any of the items from the list because they are exempt materials. For example, food, drugs, and cosmetics brought to work for employee consumption are exempt. So rubbing alcohol in the first aid kit is exempt.

Once you have as complete a list as possible, the next step is to determine if you have material safety data sheets for all of them. Check your files against the inventory you have just done. If any are missing, contact your supplier and request one. It is a good idea to document these requests, either by copy of a letter or a note regarding telephone conversations. If you have MSDSs for chemicals that are not on your list, figure out why. Maybe you do not use the chemical anymore and thus do not need the MSDS. Or maybe you missed it in your survey. Some suppliers do provide MSDSs for products that are not hazardous. You do not have to keep these.

Do not allow employees to use any chemicals for which you do not have an MSDS. The MSDS gives information you need to ensure use of proper protective measures.

## 4. Preparing and Implementing a Hazard Communication Program.

All workplaces where employees are exposed to hazardous chemicals must have a written plan that describes how the standard will be followed. Preparation of a plan is not just a paper exercise, all of the elements must be there to be in compliance. See paragraph (4) for the specific requirements regarding written hazard communication programs.

The plan does not have to be lengthy or complicated. It is intended to be a blueprint for implementation of your program – to help you cover all parts of the standard.

Many associations and groups have sample programs and other assistance materials for employers. These can be very helpful to many employers because they tend to be tailored to the particular industry. You may wish to see if your association has such materials.

Although such general guidance may be helpful, remember that the written program has to reflect what you are doing in your workplace. Therefore, if you use a generic program, adapt it to your business.

If OR-OSHA inspects your place for compliance with the HCS, the OR-OSHA compliance officer will ask to see your written plan at the beginning of the inspection. In general, they will use the following to evaluate your program.

The written program must describe how the requirements for labels and other forms of warning, material safety data sheets, and employee information and training, are met in your facility. The following gives the type of information compliance officers will be looking for to decide whether these elements of the hazard communication program have been properly addressed:

### A. Labels and Other Forms of Warning.

In-plant containers of hazardous chemicals must be labeled, tagged, or marked with the identity of the material and appropriate hazard warnings. Employers buying chemicals can rely on the labels provided by their suppliers. If the material is subsequently transferred by the employer from a labeled container to another container, the employer has to label that container unless it is subject to the portable container exemption. See paragraph (5) for specific labeling requirements.

The primary information you should get from an OSHA-required label is an identity for the material, and appropriate hazard warnings. The identity is any term that appears on the label, the MSDS, and the list of chemicals, and thus links these three sources of information. The identity used by the supplier may be common or trade name (“Black Magic Formula”), or a chemical name (1,1,1-trichloroethane). The hazard warning is a brief statement of the hazardous effects of the chemical (“flammable,” “causes lung damage”). Labels frequently have other information, such as precautionary measures (“do not use near open flame”), but this information is voluntary. Labels must be legible, and prominently displayed. There are no specific requirements for size or color, or any specified text.

With these requirements in mind, the compliance officer will be looking for the following types of information to ensure that labeling is right in your facility:

1. Designation of person(s) responsible for ensuring labeling of in-plant containers;
2. Designation of person(s) responsible for ensuring labeling of any shipped containers;
3. Description of labeling system(s) used;
4. Description of written alternatives to labeling of in-plant containers (if used); and,
5. Procedures to review and update label information when necessary.

Employers that buy and use hazardous chemicals – rather than producing or distributing them – will primarily be concerned that every purchased container is labeled. If they transfer material into other containers, the employer must ensure that these are labeled as well, unless they fall under the portable container exemption (OAR 437-004-9800(5)(f)). In terms of labeling systems, you can simply choose to use the labels provided by your suppliers on the containers. These will generally be verbal text labels, and do not usually include numerical rating systems or symbols that require special training. The most important thing to remember is that this is a continuing duty – all in-plant containers of hazardous chemicals must always have labels. Therefore, it is important to designate someone to be responsible for ensuring that the labels are maintained as required on the containers in your facility, and that newly purchased materials are checked for labels before use.

## **B. Material Safety Data Sheets.**

Chemical manufacturers and importers have to get or develop a material safety data sheet for each hazardous chemical they produce or import. Distributors must ensure that their customers get a copy of these MSDSs. Employers must have an MSDS for each hazardous chemical they use. Employers may rely on the information from their suppliers. The specific requirements for material safety data sheets are in OAR 437-004-9800(6).

The rule has no specific format for the MSDS, although there are specific things that must be on them. The MSDS must be in English. You are entitled to receive from your supplier a data sheet that includes all of the information required by the rule. If you do not get one automatically, you should request one. If you get one that is obviously inadequate, with, for example, blank spaces, you should request an appropriately completed one. If your request for a data sheet or for a corrected data sheet does not produce the information needed, you should contact your local OR-OSHA office for assistance in getting the MSDS.

The role of MSDSs under the rule is to provide detailed information on each hazardous chemical, including its potential hazardous effects, its physical and chemical characteristics, and recommendations for appropriate protective measures. This information should be useful to you as the employer responsible for designing protective programs, as well as to the workers. If you are not familiar with material safety data sheets and with chemical terminology, you may need to learn to use them yourself. A glossary of MSDS terms may be helpful in this regard. Generally speaking, most employers using hazardous chemicals will primarily be concerned with MSDS information about hazardous effects and recommended protective measures. Focus on the sections of the MSDS that are applicable to your situation.

MSDSs must be readily accessible to employees when they are in their work areas during their work shifts. This may be accomplished in many different ways. You must decide what is appropriate for your particular workplace. Some employers keep the MSDSs in a binder in a central location. Others, particularly in workplaces with large numbers of chemicals, computerize the information and provide access through terminals. As long as employees can get the information when they need it, any approach is okay. The employees must have access to the MSDSs themselves – simply having a system where the information can be read to them over the phone is only permitted under the mobile work site provision, OAR 437-004-9800(6)(h), when employees must travel between workplaces during the shift. In this situation, they have access to the MSDSs prior to leaving the primary work site, and when they return, so the telephone or radio system is simply an emergency arrangement.

In order to ensure that you have a current MSDS for each chemical in the plant as required, and that employees have access, the compliance officers will look for the following types of information in your written program:

1. Designation of person(s) responsible for obtaining and maintaining the MSDSs;
2. How the sheets are maintained in the workplace (e.g., in notebooks in the work area(s) or in a computer with terminal access), and how employees can have access to them when they are in their work area during the shift;
3. Procedures to follow when the MSDS does not come in with the first shipment;
4. For producers, procedures to update the MSDS when new and significant health information is found; and,
5. Description of alternatives to actual data sheets in the workplace, if used.

For employers using hazardous chemicals, the most important aspect of the written program in terms of MSDSs is to ensure that someone is responsible for obtaining and maintaining the MSDSs for every hazardous chemical in the workplace. The list of hazardous chemicals required as part of the written program will serve as an inventory. As new chemicals are purchased, update the list. Many employers find it convenient to include on their purchase orders the name and address of the person designated in their company to receive MSDSs.

## C. Employee Information and Training.

Each employee who may be “exposed” to hazardous chemicals must be given information and trained prior to initial assignment to work with a hazardous chemical, and when the hazard changes. “Exposure” or “exposed” under the rule means that “an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.) and includes potential (e.g., accidental or possible) exposure.” See OAR 437-004-9800(7) for specific requirements. Information and training may be done either by individual chemical, or by categories of hazards (such as flammability or carcinogenicity). If there are only a few chemicals in the workplace, then you may want to discuss each one individually. Where there are large numbers of chemicals, or the chemicals change frequently, you will probably want to train generally based on the hazard categories (e.g., flammable liquids, corrosive materials, carcinogens). Employees will have access to the substance-specific information on the labels and MSDSs.

Information and training is a critical part of the hazard communication program. Information about hazards and protective measures is given to workers through written labels and material safety data sheets. However, through effective information and training, workers will learn to read and understand such information, determine how it can be obtained and used in their own workplaces, and understand the risks of exposure to the chemicals in their workplaces as well as the ways to protect themselves. A properly conducted training program will ensure comprehension and understanding. It is not sufficient to just read material to the workers. You want to create a climate where workers feel free to ask questions. This will help you ensure that the information is understood. You must remember that the underlying purpose of the HCS is to reduce the incidence of chemical source illnesses and injuries. This is done by modifying behavior by providing hazard information and information about protective measures. If your program works, you and your workers will better understand the chemical hazards within the workplace. The procedures you establish regarding, for example, purchasing, storage, and handling of these chemicals will improve, and thereby reduce the risks posed to employees exposed to the chemical hazards involved. Furthermore, your workers’ comprehension will increase and proper work practices will be followed in your workplace.

If you are going to do the training yourself, you will have to understand the material and be prepared to motivate the workers to learn.

In reviewing your written program with regard to information and training, consider the following items:

1. Designation of person(s) responsible for conducting training;
2. Format of the program to be used (audiovisuals, classroom instruction, etc.);
3. Elements of the training program (should be consistent with the elements in paragraph (h) of this section); and,

4. Procedure to train new employees at the time of their initial assignment to work with a hazardous chemical, and to train employees when a new hazard is introduced into the workplace.

The written program should give enough details about the employer's plans in this area to assess whether or not a good faith effort is being made to train employees. OR-OSHA does not expect that every worker will be able to recite all of the information about each chemical in the workplace. In general, the most important aspects of training under the HCS are to ensure that employees are aware that they are exposed to hazardous chemicals, that they know how to read and use labels and material safety data sheets, and that, as a consequence of learning this information, they are following the appropriate protective measures established by the employer. OR-OSHA compliance officers will talk to employees to determine if they have received effective training, if they know they are exposed to hazardous chemicals, and if they know where to obtain substance-specific information of labels and MSDSs.

The rule does not require employers to maintain records of employee training, but many employers choose to do so. This may help you monitor your own program to ensure that all employees are appropriately trained. If you already have a training program, you may simply have to supplement it with whatever additional information is required under the HCS.

An employer can provide employees information and training through whatever means are appropriate and protective. Although there would always have to be some training on-site (such as informing employees of the location and availability of the written program and MSDSs), employee training may be satisfied in part by general training about the requirements of the HCS provided by, associations, colleges and professional schools. Also, previous training, education and experience of a worker may relieve the employer of some of the burdens of informing and training that worker. Regardless of the method, the employer is always ultimately responsible for ensuring that employees are adequately trained. If the compliance officer finds that the training is deficient, the employer will be cited for the deficiency regardless of who actually did the training on behalf of the employer.

#### **D. Other Requirements.**

In addition to these specific items, compliance officers will ask the following questions in assessing the adequacy of the program:

Is there a list of the hazardous chemicals in each work area or at a central location?

Are methods the employer will use to inform employees of the hazards of non-routine tasks outlined?

Are employees told of the hazards associated with chemicals in unlabeled pipes in their work areas?

On multi-employer work sites, has the employer given other employers information about labeling systems and precautionary measures where the other employers have employees exposed to the initial employer's chemicals?

Is the written program available to employees and their designated representatives?

If your program adequately addresses the means of communicating information to employees in your workplace, and answers the basic questions outlined above, it complies with the rule.

## 5. Checklist for Compliance.

The following checklist will help to ensure you are in compliance with the rule:

- Obtained a copy of the rule.
- Read and understood the requirements.
- Assigned responsibility for tasks.
- Prepared an inventory of chemicals.
- Ensured containers are labeled.
- Obtained MSDS for each chemical.
- Prepared written program.
- Made MSDSs available to workers.
- Conducted training for workers.
- Established procedures to maintain current program.
- Established procedures to evaluate effectiveness.

## 6. Further Assistance.

If you have a question regarding compliance with the HCS, you should contact OR-OSHA Technical Services for assistance at 503-378-3272. Free consultation services are also available to assist employers, and information about these services is available at the above number also.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).  
**Stats. Implemented:** ORS 654.001 through 654.295.  
**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.



## 437-004-9830 Retention of Dot Markings, Placards and Labels.

(1) If you receive any container or vehicle containing hazardous material, marked to comply with U.S. Department of Transportation Hazardous Materials Regulations (49 CFR Parts 171 through 180), you must keep those markings in place and legible until the container is empty enough of product, residue or vapors to eliminate all hazards.

(2) Markings, placards and labels must be readily visible.

(3) For non-bulk packages that will not be reshipped, you comply with this section if a label or other acceptable marking is affixed according to the Hazard Communication Standard.

(4) For this section, "hazardous material" and other terms not defined here have the same definition as in the Hazardous Materials Regulations (49 CFR Parts 171 through 180).

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

## 437-004-9850 Pipe Labelling.

(1) **Scope and application.** This applies to all pipes containing hazardous substances or that use asbestos as insulation material. This does not apply to buried pipe.

### (2) Definitions.

**Hazardous substances:** any substance that is a physical or health hazard.

**Health hazard:** a chemical for which there is statistically significant evidence that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosive sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes or mucous membranes.

**Physical hazard:** a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, or oxidizer, pyrophoric, unstable (reactive) or water-reactive.

**Pipe:** includes pipes, valves and pipe coverings.

### (3) Labelling.

(a) Label pipes that contain hazardous substances or transport substances in a hazardous state according to (A), (B), (C) and (D) below or otherwise identify them according to (c) below:

(A) Positive identification of the hazardous contents of pipe must be by lettered labels. The label must give the name of the contents in full or abbreviated form.

# Z CHEMICAL/TOXINS

(B) The label must identify the contents with enough detail to identify the hazard.

(C) Label wording must be brief, informative and simple.

(D) Use stenciling, tape, adhesives, markers or approved alternative means for labels.

(b) Label pipes with asbestos insulation according to (b)(A) below, or otherwise identify them according to (3)(c) below:

(A) The label for pipe insulation containing asbestos must include the following:

**DANGER  
CONTAINS ASBESTOS FIBER  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD**

(c) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials instead of affixing labels to individual pipes, if the alternative method identifies the pipe(s) to which it is applicable and conveys the information required by this rule. The written materials must be readily accessible to the employees in their work areas during each shift.

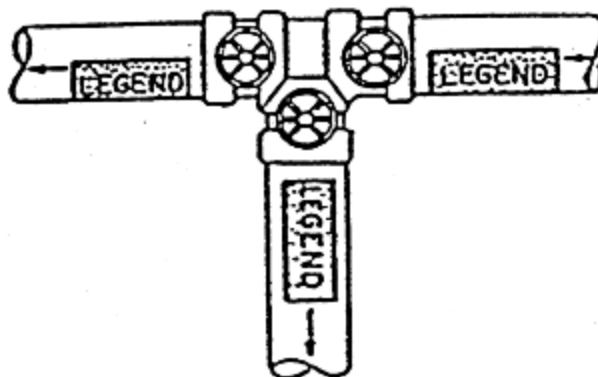
#### (4) Location of labelling.

(a) Place the labelling where confusion may occur, such as near valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls, floors or ceilings.

(b) Labelling must be, at a minimum, at the beginning and end of continuous pipe runs.

(c) For asbestos insulation, labelling must be at a minimum, on unobstructed continuous pipe runs, every 75 feet.

*Illustration 1 - Location of Labelling*



## **(5) Visibility.**

**(a)** Where pipes are above or below the normal line of vision, put the lettering below or above the horizontal centerline of the pipe.

**(b)** If pipes are inaccessible and/or at a distance that precludes clear identification of the letters on labelling, use alternatives to the labelling that meet all other requirements of this rule (i.e., schematics posted on walls in work areas).

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.



## Appendix A for Pipe Labelling (Non-Mandatory)

**Table 1 - Classification of Hazards of Materials and Suggestions of Colors**

Classification	Color Field**	Color of Letters for Legends
<b>Materials Inherently Dangerous</b>		
Flammable or Explosive .....	Yellow	Black
Chemically Active or Toxic .....	Yellow	Black
Extreme Temperatures or Pressures .....	Yellow	Black
Radioactive .....	Yellow	Magenta
<b>Materials of Inherently Low Hazard</b>		
Liquid or Liquid Admixture .....	Green	White
Gas or Gaseous Admixture .....	Blue	White

\*\* Alternatives to the colors suggested by Table 1 may be acceptable if they meet all other requirements of this appendix and are used consistently on all pipes in a given location.

- (1) Color may be displayed on the piping by any physical means, but when it is used it must be in combination with labels.  
(2) Color may be used in continuous, total length, or in intermittent displays.

### Types and Sizes of Letters

- (1) There must be contrast between color field and letters for readability.  
(2) Use of letters of block lettering in sizes 1/2-inch (13 mm) and larger, is recommended. (Table 2)

**Table 2 - Types and Styles of Letters**

Outside Diameter of Pipe or Covering		Length of Color Field		Size of Letters	
in.	mm.	in.	mm.	in.	mm.
3/4 to 1 1/4	19 to 32	8	200	1/2	13
1 1/2 to 2	38 to 51	8	200	3/4	19
2 1/2 to 6	64 to 150	12	300	1 1/4	32
8 to 10	200 to 250	24	600	2 1/2	64
over 10	over 250	32	800	3 1/2	89

- (3) For identification of materials in pipes less than 3/4-inch (19 mm.) in diameter, and for valve and fitting identification, the use of a legible tag is recommended.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.



## **437-004-9860 Hazardous Chemicals in Laboratories.**

OAR 437-002-1910.1450 applies to exposure of agricultural employees to hazardous chemicals in laboratories that do work other than quality control or quality assurance.

**Stat. Auth.:** ORS 654.025(2) and 656.726(4).

**Stats. Implemented:** ORS 654.001 through 654.295.

**Hist:** OR-OSHA Admin. Order 4-1998, f. 8/28/98, ef. 10/1/98.

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